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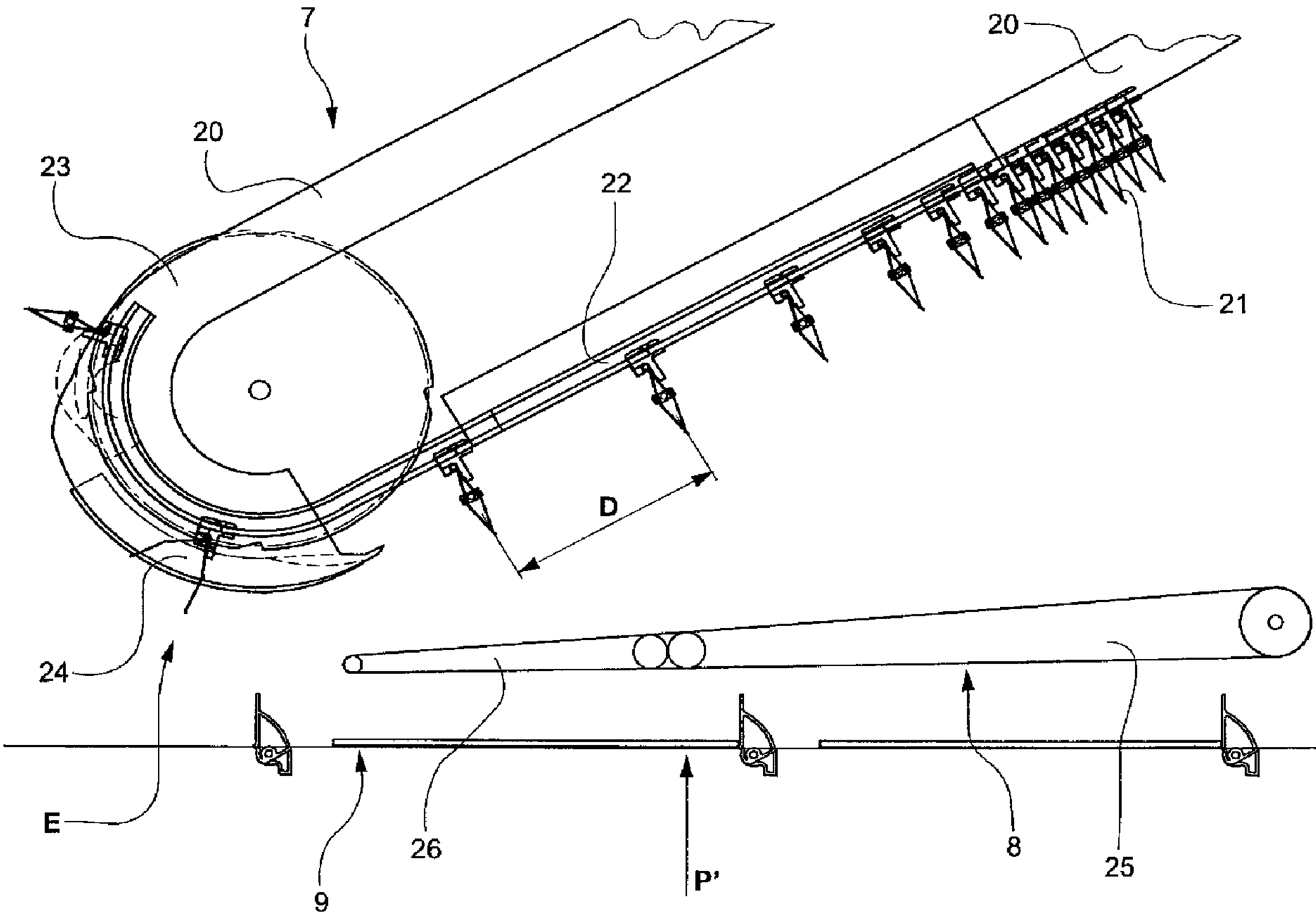
(54) Titre : METHODE ET DISPOSITIF DE POSITIONNEMENT HORIZONTAL D'OBJETS PLATS TRANSPORTES EN SERIE

(54) Title: METHOD AND DEVICE FOR THE HORIZONTALPOSITIONING OF SERIALLY CONVEYED, FLAT OBJECTS



(57) Abrégé/Abstract:
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(57) Abrégé(suite)/Abstract(continued):
edge zones (13) of the objects (1) are selectively accelerated or retarded relative to the upper edge zones (12), so that the objects (1) are brought into a position inclined relative to the vertical. Thereupon the upper edge zones (12) are released and the objects (1) with the assistance of the force of gravity are positioned on an onward conveying means, selectively either the downstream or the upstream main surface (10 or 11) facing upwards. For retarding. resp., accelerating the lower edge zones (13), for example, a conveyor belt or two conveyor belts adjoining one another is or are utilized, the speed (v.3) of the conveyor belts being adjustable for a conversion from accelerating operation to retarding operation. The principle advantage of the method and device described is the easy convertibility. Method and device, for example, can be utilized for collating printed products or printed part products.

ABSTRACT

For the horizontal positioning of serially supplied, flat objects (1) to be conveyed onward, the objects (1) are supplied suspended, one of their main surfaces (10) facing downstream and the other main surface (11) facing upstream. Prior to positioning, lower edge zones (13) of the objects (1) are selectively accelerated or retarded relative to the upper edge zones (12), so that the objects (1) are brought into a position inclined relative to the vertical. Thereupon the upper edge zones (12) are released and the objects (1) with the assistance of the force of gravity are positioned on an onward conveying means, selectively either the downstream or the upstream main surface (10 or 11) facing upwards. For retarding, resp., accelerating the lower edge zones (13), for example, a conveyor belt or two conveyor belts adjoining one another is or are utilized, the speed (v.3) of the conveyor belts being adjustable for a conversion from accelerating operation to retarding operation. The principle advantage of the method and device described is the easy convertibility. Method and device, for example, can be utilized for collating printed products or printed part products.

METHOD AND DEVICE FOR THE HORIZONTALPOSITIONING OF SERIALLY CONVEYED, FLAT OBJECTS

The invention lies in the field of piece goods conveyance. A method and device according to the instant invention serve the purpose of horizontally positioning for onward conveyance a large number of identical or similar flat objects (piece goods) being supplied in a serial stream.

One example of an application, in which serially supplied, flat objects are positioned horizontally on a conveying device, is the collating of parts of printed products to form stacks of part products. The collated stacks are then processed each into a finished printed product (e.g., a book or a brochure), usually by binding or stapling. For such a collating operation, for example, a conveyor belt is utilized as a conveying device, with either transverse walls or toes (catches) at a distance to one another in the conveying direction and dividing the conveying track into conveying compartments of equal size. These conveying compartments are transported either continuously or in a clocked cycle past a row of feed points arranged one behind the other. At each of the feed points a part product is deposited in every passing conveying compartment, so that during transportation along the conveying track a stack of part products is produced in every conveying compartment. At the end of the stack conveying track, each of the stacks has a number of part products equivalent to the number of the active feed points it has passed.

Instead of using the named conveyor belt with conveying toes (catches) or transverse walls, the stacks in production can also be pushed along a suitable base by transport cams (catches). Such pushed conveying can be carried out continuously or in a clocked cycle alternating with standstills.

For the supply and horizontal positioning necessary in the mentioned application example, the flat objects are usually conveyed towards a feed point parallel to their main surfaces and one after the other or overlapping one another and they are pushed onto the

onward conveying device, resp., onto a stack of other flat objects being transported past the feed point with the help of the onward conveying device. The feeding direction for this purpose is directed towards the onward conveying direction from above and advantageously intersects the plane (conveying plane), on which the conveyed objects are lying, at an acute angle.

In the case of clocked onward conveyance, for which, for example, conveying compartments are stopped for feeding steps and are transported on between feeding steps, the supply direction can be relatively freely selected relative to the onward conveying direction (projection of the supply direction into the onward conveying plane). This means that the supply direction, for example, can be transverse to the onward conveying direction (transverse supply) or it can be the same as the onward conveying direction (parallel supply). In the case of continuous onward conveying, supply of the latter type is particularly suitable. i.e. supply with a feed direction lying in the same plane perpendicular to the onward conveying plane as the onward conveying direction and approaching the onward conveying line from above and at an acute angle.

In the case of square or rectangular, flat objects being supplied by transverse supply, the edges being directed downstream in the supply stream are positioned on the one side of the onward conveying means opposite the feed and they are oriented parallel to the onward conveying direction. In the case of a parallel supply, the edges being oriented downstream in the supply stream remain the leading edges on onwards conveyance being aligned perpendicular to the conveying direction. For flat objects with other shapes, the same applies in analogy for corresponding edge zones.

Known devices for collating printed products, for example, comprise sheet feeders for supplying the part products. Usually these sheet feeders are supplied with part products by hand, the part products being deposited in a stacking shaft. From the stacking shaft the part products are decollated to form a conveying stream. In this stream, they are conveyed towards the feed point essentially parallel to their main surfaces one after the other or

overlapping one another and they are pushed onto the stacks under production. This means that the position of the products on the stacks under production is correlated in a fixed manner with the position of the products in the stacking shaft. Therefore, for a predefined product position on the stacks being produced, the products have to be filled into the stacking shaft in a corresponding manner.

It is also known to supply feed points by uncoiling stations, in which stations a stream of imbricated printed products is uncoiled from a corresponding coil and is supplied to the feed point. Feeding by means of a continuously supplied product stream is also known. In both cases it is advantageous to interpose a buffer between the feed point and the supply device. For such equipped feed points also, there is a fixed relationship between the product orientation in the supply stream and the product orientation on the stacks being produced by collating. If this correlation is to be changeable, then devices have to be provided, with which the supply stream of imbricated products can be reorganized, i.e., re-scaling devices, e.g. for reversing the stream or for recoiling a product coil. Devices of this kind are expensive and take up a lot of space.

It is also known to produce stacks from a plurality of different printed products, such as newspapers, magazines, advertising brochures and other advertising material using a collating device and then package the stacks to form complete shipping units e.g. using a folio assembler. In shipping units of this kind the orientation of the individual products is not predefined, as is the case for a stack of part products to be assembled to form one product. On the contrary, there is the desire to arrange the two outermost products of the stack in such a way, that the front side of both is visible through the folio, and to arrange the products inside the stack in such a manner, that thicker folded edges are distributed as uniformly as possible over two opposite sides of the stack to stabilize the stack. Because usually only relatively small numbers of the mentioned shipping units with the same composition have to be made up, this signifies, that the supply orientation of the products has to be changed time and again.

With the known supply systems, such changes have to be carried out by persons operating the sheet feeders by filling the products into the stacking shaft with varying orientations depending on the shipping units to be produced. This quite invariably leads to mistakes. Other supply systems have to be correspondingly retooled for such changes and then to be set up, resp., adjusted for the change. As already mentioned above, this is expensive. It is here, that the invention shall provide new solutions.

The invention therefore has the objective of creating a method and a device, by means of which flat objects, which are supplied in a serial conveying stream, can be horizontally positioned for an onward conveyance, wherein with the same orientation of all objects in the supply stream it shall be possible, with the simplest of measures, to set two different orientations for the objects on onward conveyance. In achieving this, the method shall be designed in such a manner, that it can be carried out with a simple device, which can easily be adjusted for two positioning orientations.

According to the invention, the flat objects are supplied in suspended manner and with their main surfaces vertical or inclined (not parallel) to the feeding direction in such a manner, that one of their main surfaces is facing downstream and the other one id facing upstream. This means that the flat objects in the supply stream are held individually or if so required in small groups by grippers by an upper edge zone. Lower edge zones are movable in the feeding direction relative to the upper edge zones as a result of a corresponding flexibility of the objects and/or of a corresponding ability to swivel of the grippers. This means that using appropriate means, the objects can be brought into positions, in which the lower edge zone of each object is not situated vertically below the upper edge zone held by a gripper, but is either ahead of it or trails behind it.

Immediately before the horizontal positioning of an object, a positioning device engages the lower edge zone of the objects and accelerates or retards this lower edge zone

versus the upper edge zone in dependence of the desired positioning orientation. As a result of this, the object is brought into an inclined position relative to its vertical position, which it assumes in freely suspended conveyance. When the object is sufficiently inclined, it is released by the gripper and is finally positioned by the force of gravity and if so required guided by the positioning means.

If before positioning the lower edge zone is accelerated versus the upper edge zone, the one main surface of the flat object which was facing downstream in the supply stream is facing upwards after positioning. If before positioning the lower edge zone, however, is retarded, then the one main surface which was facing upstream in the supply stream is facing upwards.

Onward conveyance, as in the case of known methods as briefly described above, can be clocked or continuous. In the case of clocked onward conveyance, in which the objects are essentially positioned on a conveying surface being stationary at this point in time, the feeding, for example, can be transverse to the direction of onward conveyance or parallel to it. In the case of continuous onward conveyance, feeding has advantageously substantially the same direction as onward conveyance. For parallel feeding, a lower edge zone accelerated prior to positioning becomes the leading edge zone for onward conveyance, a correspondingly retarded edge zone becomes the trailing edge zone.

The device in accordance with the invention comprises a supply means and a positioning means, both being matched to an onward conveying means.

The supply means serves for supplying the flat objects in a suspended position in a controlled manner. For this purpose, it has a multitude of grippers displaceable under control in the feeding direction. Advantageously these grippers are relatively freely swivellable in the feeding direction. The grippers, for example, are attached to a circulating conveying organ at a regular distance from one another. The grippers, however, can also be displaceable more or less independent of one another and, for example, can be buffered ahead of the feeding point and called up from the buffer specifically for the feeding operation.

The supply means furthermore comprises deactivation means, through which the grippers are deactivated at a predefined release point for releasing the objects. The deactivation means can be controlled in such a manner, that only a predetermined part of the grippers is deactivated, while not deactivated grippers pass the release point without releasing the object they are gripping.

The positioning means serves for retarding or accelerating lower edge zones of objects conveyed by the supply means prior to positioning. The positioning means, for example, is designed as a conveyor belt, which extends underneath the grippers and which forms an acute angle with the feeding direction, the apex of which is in the area of the release point. The speed, with which the positioning means moves the lower edge zones towards the release point, is adjustable to a minimum of two values. In this respect, one of these speeds for accomplishing an acceleration of the lower edge zones is greater than the conveying speed of the feeding means and the other one for a corresponding retardation is smaller than the conveying speed or else also can be zero. If so required, the position of the positioning means is adjustable relative to the supply means.

The supply means and the positioning means are matched to one another and to the onward conveying means in such a way, that an object, when it is released by the gripper has an inclined position. This inclination has such an extent, that the object can be positioned at the predetermined point of the onward conveying means (e.g., in a conveying compartment) having the predetermined orientation (leading or trailing main surface on top) by the effect of the force of gravity and if necessary with controlled assistance by parts of the positioning means.

The method according to the invention and an exemplary embodiment of the corresponding device are described in more detail in association with the following Figures. These illustrate:

Figures 1 and 2 the operating principle of the method and of the device in accordance with the invention (Figure 1: acceleration of the lower edge zones; Figure 2: retardation of the lower edge zones);

Figure 3 an exemplary embodiment of the device according to the invention;

Figure 4 successive feeding and positioning phases a to e of the device according to Figure 3 operating with accelerated, lower edge zones;

Figure 5 successive feeding and positioning phases a to e of the device according to Figure 3 operating with retarded, lower edge zones.

Figures 1 and 2 schematically illustrate the operating principle of the method and of the device according to the invention on an exemplary embodiment. In Figure 1, it is shown in operation with acceleration of the lower edge zones, i.e. for horizontal positioning with the leading main surface on top, in Figure 2 in operation with retardation of the lower edge zones, i.e. for horizontal positioning with the trailing main surface on top. The Figures illustrate a continuous onward conveyance in conveying compartments with parallel feeding. For a clocked onward conveyance, the Figures and the explanations of the following paragraphs need to be adapted correspondingly.

Figures 1 and 2 depict as dot-and-dash lines the feeding direction F.1, which in essence designates the conveying path of the upper edge zones of the objects being supplied, the direction of onward conveyance F.2 and the conveying direction F.3 of the positioning means, which essentially designates the conveying path of the lower edge zones of the objects being supplied. All three conveying directions are situated one beneath the other in one pane (paper plane of the Figures), which is at right angles to the onward conveying plane (perpendicular to the paper plane of the Figures). In this, F.2 and F.3 run essentially parallel to one another or slightly towards one another and F.1 forms an acute angle α with F.3, resp., F.2. The release point E is situated in the area of the intersecting point of F.1 and F.3.

Figures 1 and 2 also illustrate a plurality of flat objects 1 being supplied and positioned. The Figures can also be understood as depicting one only object in phases (1.1 to 1.4) of the supplying and positioning process, the point in time of successive phases differing by one conveying clock cycle T. The objects 1 have two essentially parallel main surfaces 10 and 11, the surfaces being aligned transverse to the paper plane, and they have upper edge zones 12 and lower edge zones 13. During supply, one of the main surfaces (10) is facing downstream, the other one (11) is facing upstream. The depicted objects 1 are not significantly bendable, so that the grippers (not shown) of the supply means which grippers hold the objects have to be designed as freely swivelling in the feeding direction. The objects 1 have a suspended length L and are conveyed, for example, with unchanging distances D from one another, wherein D advantageously is as small as possible.

Furthermore, the Figures 1 and 2 show an onward conveying means being partitioned into conveying compartments 2 of the same size by conveying toes 2'. The conveying compartments 2 have a length $L + \Delta L$ in the direction of onward conveyance F.2, which is greater than the suspended length L of the objects.

The feeding speed v.1 is D/T, the onward conveying speed v.2 is $(L + \Delta L)/T$, wherein T is the length of a conveying cycle, i.e., the length of the time period between two equivalent conveying situations at any point of the conveying system.

According to Figure 1, the object 1.4 is just being released, the object 1.3 is one conveying clock cycle before its release, the object 1.2 two conveying clock cycles and the object 1.1 three conveying cycles before its release. The object 1.1 is still within the zone of freely suspended conveyance, in which zone no accelerating force is exerted on the lower edge zones 13, so that the lower edge zone 13 of the object 1.1 is positioned essentially vertically underneath the upper edge zone 12. The lower edge zone 13 of the object 1.2 has just reached the action area of the positioning means, i.e., object 1.2 is in a position in which acceleration of the lower edge zone 13 versus the upper edge zone 12 is starting. The lower edge zone 13 of the object 1.3 is already running ahead of the upper edge zone 12. The object

1.4 has reached the release point E and is released from the gripper, in order to fall onto the onward conveying means (object 1.4', dot-and-dash line), where it is conveyed onwards with the main surface 10 which was facing downstream on being supplied now directed upwards and with the lower edge zone 13 leading.

From Figure 1 it is apparent, that at least in the case of a constant feeding speed the speed of the lower edge zones is not a constant speed. In order for the positioning means to be able to accelerate these lower edge zones, its speed has to be greater than the initial and greatest speed of the lower edge zones. This speed is essentially dependent on the angle α and the length L. As will still have to be demonstrated, these parameters are advantageously arranged in such a manner, that the speed v.3 of the positioning means is approximately the same as the speed v.2 of the onward conveying means.

From Figure 1 it is apparent, that for an operation with acceleration of the lower edge zones 13, i.e. for horizontal positioning with leading main surfaces 10 directed upwards, the following necessary and desirable conditions apply:

- The speed v.3 of the positioning means has to be greater than the speed v.1 of the supply means.

- The conveying compartment, in which an object (1.4) is to be positioned, has to extend by at least the length L downstream from the release point E at the time of the release of the object.

- In order to avoid interactions between a just released object (1.4) and a following object (1.3), the parameter D is advantageously matched to the length L in such a manner, that the lower edge zone of an object (1.3) has not yet reached the level of the release point E, when the preceding object (1.4) is released (for rigid objects and for a small distance between F.2 and F.3: $D \cong L$, for bendable objects smaller).

- The action of the positioning means has to end in a position P upstream of the release point E, advantageously in such a manner, that the end of the positioning means guides a lower edge zone into the one conveying compartment, in which the corresponding object is to be deposited. (P is approximately at position W of the end of the onward conveying compartment, into which an object is just being deposited).

- For a problem-free transfer of the lower edge zone from the positioning means to the onward conveying means, the speed v.3 of the positioning means is advantageously approximately the same as the speed v.2 of the onward conveying means.

Figure 2 illustrates the same arrangement as Figure 1, which, however, is operated with a retardation of the lower edge zones, i.e. for horizontal positioning with the trailing main surface 11 directed upwards. The reference signs are the same and the description is to be adapted correspondingly.

From Figure 2 it is apparent, that the speed of the lower edge zones 13 is not a constant speed; with the first contact with the positioning means it is so to say zero and then increases. In order for the positioning means to be able to retard the lower edge zones, the speed v.3 of the positioning means therefore has to be very low or the positioning means has to be at a standstill. As soon as the upper edge zone has reached the release point E, the retarding effect of the positioning means on the lower edge zone has to cease (position P', upstream of E by around L). If the positioning means reaches further towards the release point E than up to the position P', it must serve as a guide for the released objects onto the onward conveying means in this forward region and therefore should advantageously have a speed, which is approximately the same as the speed v.2 of the onward conveying means.

From Figure 2 it is apparent, that for operation with retardation of the lower edge zones 13, i.e. for horizontal positioning with trailing main surfaces 11 directed upwards, the following necessary and desirable conditions apply:

- The speed v.3 of the positioning means has to be smaller than the speed v.1 of the supply means. Advantageously it is equal to zero.

- The conveying compartment, in which an object is to be positioned, has to extend upstream from the release point E by at least the length L at the time of the release of the object.

- The retarding effect of the positioning means must cease for every object at the time it is released, i.e. upstream of the release point E by approximately L (position P').

- If the positioning means extends further towards the release point E, then this exit region of the positioning means advantageously has a speed v.3, which approximately corresponds to the onward conveying speed v.2.

From a comparison of the Figures 1 and 2 it is apparent, that for conversion from an operation accelerating the lower edge zones 13 to one retarding the lower edge zones 13, in essence only the speed v.3 of the positioning means and the synchronization between the supply means and the onward conveyance (synchronization between feeding grippers and onward conveying compartments 2) have to be adapted. In addition, the positioning means can be displaced upstream (end of P into position P'). The last mentioned adjustment can be avoided, if the positioning means consists of two parts: an entry zone, in which it can be switched on or off and which extends downstream up to the position P', and an exit zone, the speed of which is independent of the mode of operation and which extends between the positions P' and P. All other parameters, in particular the position of the release point and the distance D of the supplied objects do not have to be adjusted.

For handling objects with shorter suspended lengths than a length being adapted to the length of the conveying compartments, the height of the positioning means and/or of the supply means above the onward conveying means may be adjustable.

Figure 3 in more detail depicts an exemplary embodiment of the device according to the invention. The supply means 7 of this device comprises rails 20, along which grippers 21 are moveable essentially independently of one another towards the release point E and away from the release point E. Upstream of the release point E and as close as possible to it, the grippers 21 are buffered, released from the buffer as required and then, for example, by means of a screw conveyor 22 with a pitch, which increases towards the release point E, are transported towards the release point. The grippers are such clocked to have a distance D from one another, which is suitable for the positioning. In the region of the release point E, the grippers are taken over by a clutch drive wheel 23 and are transported onwards. At the release point E, they are opened by means of a suitable cam 24.

The use of grippers which are movable independently of one another has the advantage, that the objects can be buffered only a little distance upstream of the release point and can be individually released from the buffering. This also has the benefit, that the given condition for the distance D between the objects (see above) can be satisfied at the same time as the desire for small spacings between the objects.

A device suitable as a supply means 7 of the device in accordance with the invention, is described, for example, in the publication WO-99/33731.

The positioning means 8 comprises an entry conveyor belt 25 and an exit conveyor belt 26, which two conveyor belts meet in the position P'. For operation with edge acceleration, the entry conveyor belt 25 has a speed, which is approximately the same as the speed of the onward conveying device 9 and the same as the speed of the exit conveyor belt 26. For operation with edge retardation, the entry conveyor belt 25 is stationary. Instead of the two conveyor belts 25 and 26, it is also possible to use a single conveyor belt, with a speed, which is approximately the same as the speed of the onward conveying means 9. For operation with edge retardation, the entry region of this conveyor belt is covered with suitable means.

Figures 4 and 5 each illustrate five phases a to e of a conveying clock cycle of the device in accordance with Figure 3 operated with edge acceleration (Figure 4) and with edge retardation (Figure 5), wherein in each case the first phase a depicts an object 1.4 one conveying clock cycle before its release and the last phase e depicts the release of this object. As the device is the same as the one illustrated in Figure 3, there are - also for clarity reasons - no reference numbers in Figures 4 and 5.

Figures 4 and 5 also further clarify the difference in the handling of essentially bendable flat objects, as newspapers and magazines usually are, compared to the handling of in essence rigid objects, as it is depicted in Figures 1 and 2.

Method and device according to the invention are suitable for collating printed products or printed part products and in particular for collating different printed products to form stacks which stacks are then assembled into folios for shipping.

CLAIMS

1. A method for horizontal positioning of flat objects, each flat object having two essentially parallel main surfaces, the method comprising the steps of:

supplying the flat objects serially in a feeding direction, each object being held by an upper edge zone and having a lower edge zone freely suspended, one main surface of each object facing downstream and the other main surface facing upstream, the feeding direction being directed toward an onward conveying direction at an acute angle from above;

during said supplying step, bringing the objects into a position inclined to the vertical by selectively accelerating or retarding the lower edge zones relative to the upper edge zones;

releasing the upper edge zone of each object when the object is at a release point in their inclined position and, under the influence of gravity, positioning the released objects with selectively either said one main surface or said other main surface facing upwards; and

conveying the positioned objects onward in the onward conveying direction;

wherein the objects are horizontally positioned in conveying compartments, which conveying compartments are continuously conveyed in the onward conveying direction; and

wherein, for converting from accelerating operation to retarding operation, the synchronization between the supply of the objects and the conveyance of the conveying compartments is modified.

2. The method in accordance with claim 1, wherein, following release of the upper edge zone, the objects are guided into position.

3. The method in accordance with claim 1 or 2, wherein a projection of the feeding direction onto a horizontal plane is generally parallel to the onward conveying direction.

4. The method in accordance with claim 1, wherein, for acceleration, the lower edge

zones are brought into contact with a positioning means, which positioning means has a speed in the same direction as the onward conveyance and in the same range as the onward conveying speed.

5. The method in accordance with claim 1, wherein, for retardation, the lower edge zones are brought into contact with a stationary positioning means.

6. The method in accordance with claim 5, wherein the positioning means comprises an exit region directed toward the release point, said exit region having a speed in the same direction as the onward conveying direction, said exit region speed being approximately the same as the onward conveying speed.

7. A device for the horizontal positioning of serially supplied, flat objects to be conveyed onward, the device comprising: supply means defining a feeding direction, onward conveying means defining an onward conveying direction and positioning means, wherein the feeding direction is directed toward the onward conveying direction from above at an acute angle, wherein the supply means comprises rails and a plurality of grippers movable independently of one another along the rails, said grippers being movable one after the other in the feeding direction and being designed each for holding one object at an upper edge zone of said object, lower edge zones of each of said objects being freely movable in the feeding direction relative to the upper edge zones, wherein the supply means further comprises a deactivation means for deactivating the grippers and releasing the held object at a release point, wherein the positioning means defines a conveying direction of the lower edge zones of the objects upstream of the release point and is arranged between the supply means and the onward conveying means in such a manner that said conveying direction forms an acute angle with the feeding direction, and wherein the positioning means is operated in one of two selectable modes including two different speeds toward the release point, and wherein means for buffering the grippers, means for taking the grippers from the buffering means, and means for accelerating and clock cycling the grippers are provided upstream of the release point, and wherein means for onward conveyance of the grippers is provided in a region of the release point.

8. The device in accordance with claim 7, wherein the grippers are adapted to swivel in the feeding direction.

9. The device according to claim 7, wherein the positioning means is displaceable in the direction of the conveying direction.

10. The device in accordance with claim 7, wherein the positioning means comprises an entry region and an exit region, the entry region being driven at a first speed and the exit region being driven with at second speed equal to the first speed.

11. The device in accordance with claim 10, wherein the positioning means comprises a conveyor belt and the entry region is covered by a stationary cover that serves to retard movement of the lower edges zones of the objects relative to the upper edge zones of the objects.

12. The device in accordance with claim 7, wherein the positioning means comprises two conveyor belts adjoining one another in the direction of conveyance.

13. The device in accordance with claim 7, wherein the means for accelerating and for clock cycling the grippers includes a screw conveyor.

14. The device in accordance with claim 7, wherein the means for onward conveyance of the grippers includes a clutch drive wheel.

15. The device in accordance with claim 7, wherein the means for deactivating the grippers includes a cam.

16. Use of a method in accordance with any one of claims 1 to 6 for collating printed products or printed part products to form stacks of printed products or stack-shaped printed products comprising printed part products.

17. Use of a device in accordance with any one of claims 7 to 15 for collating printed products or printed part products to form stacks of printed products or stack-shaped printed products comprising printed part products.

18. A method for horizontal positioning of flat objects, each flat object having two essentially parallel main surfaces, the method comprising the steps of:

supplying the flat objects serially in a feeding direction, each object being held by an upper edge zone and having a lower edge zone freely suspended, a first main surface of each object facing downstream and a second main surface of each object facing upstream, the feeding direction being directed toward an onward conveying direction at an acute angle from above;

during said supplying step, bringing the lower edge zones of the objects into contact with a positioning means whilst continuing to hold the objects by their upper edge zones;

during a first period of time, operating the positioning means in a first mode for accelerating the lower edge zones of the objects relative to the upper edge zones along the feeding direction;

releasing the upper edge zone of each object when the object is at a release point and, under the influence of gravity, positioning the released objects onto the onward conveying means with their second main surface facing upwards; and

conveying the positioned objects onward in the onward conveying direction via the onward conveying means.

19. The method according to claim 18, comprising:

switching the positioning means from the first mode to a second mode for retarding the lower edge zones of the objects relative to the upper edge zones along the feeding direction;

during a second period of time not overlapping with the first period of time, operating the positioning means in the second mode;

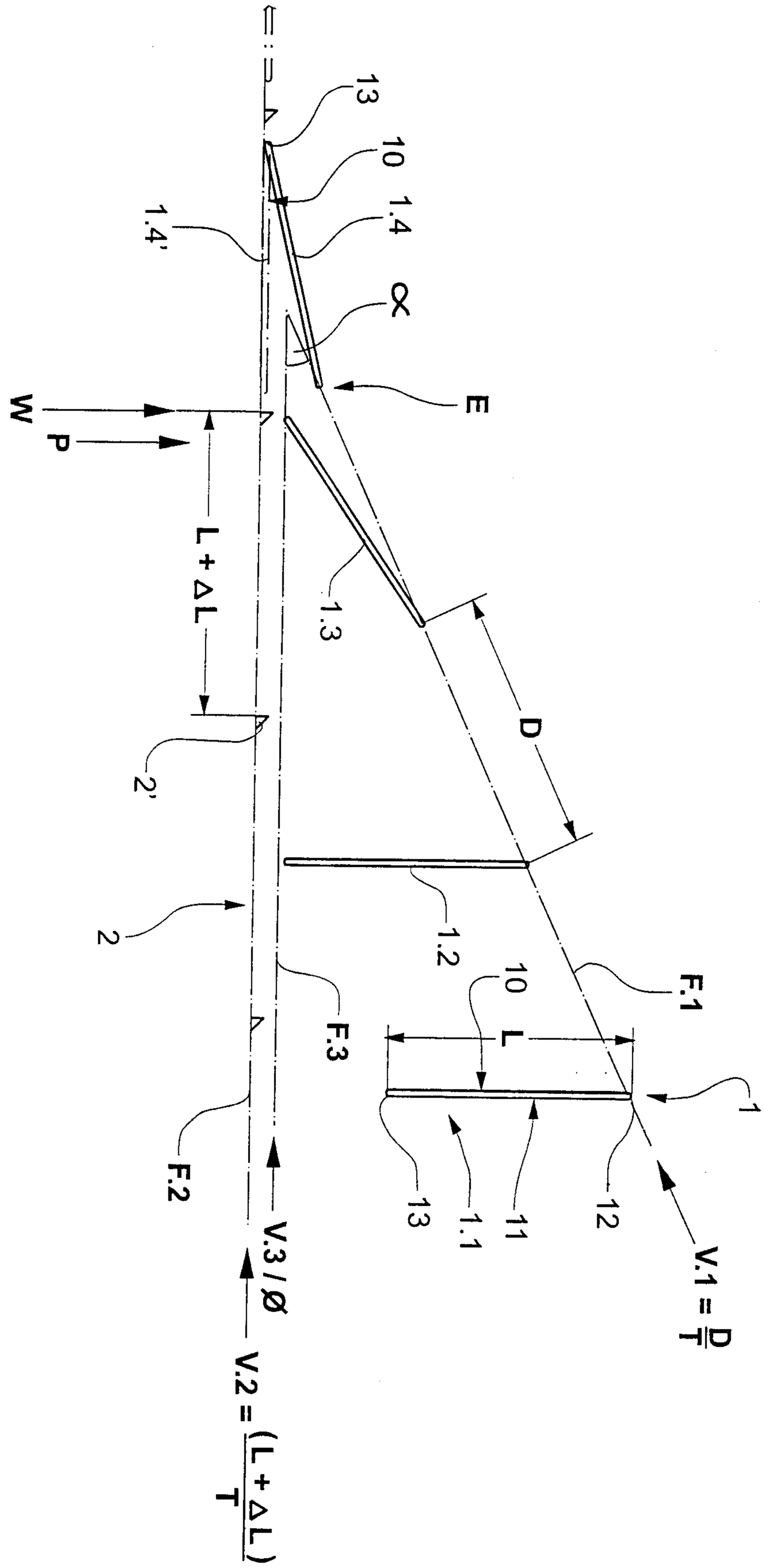
releasing the upper edge zone of each object when the object is at a release point and, under the influence of gravity, positioning the released objects onto the onward

conveying means with their first main surface facing upwards; and

conveying the positioned objects onward in the onward conveying direction via the onward conveying means.

20. The method according to claim 19, wherein the positioning means comprises at least a conveyor belt and wherein switching the positioning means from the first mode to the second mode comprises changing an operating speed of the at least a conveyor belt.

21. The method according to claim 19, wherein the positioning means comprises at least a conveyor belt and wherein switching the positioning means from the first mode to the second mode comprises covering at least a portion of the at least a conveyor belt with a covering means.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V.1 = D/T
V.3 / Ø
V.2 = (L+ΔL)/T

Fig.1

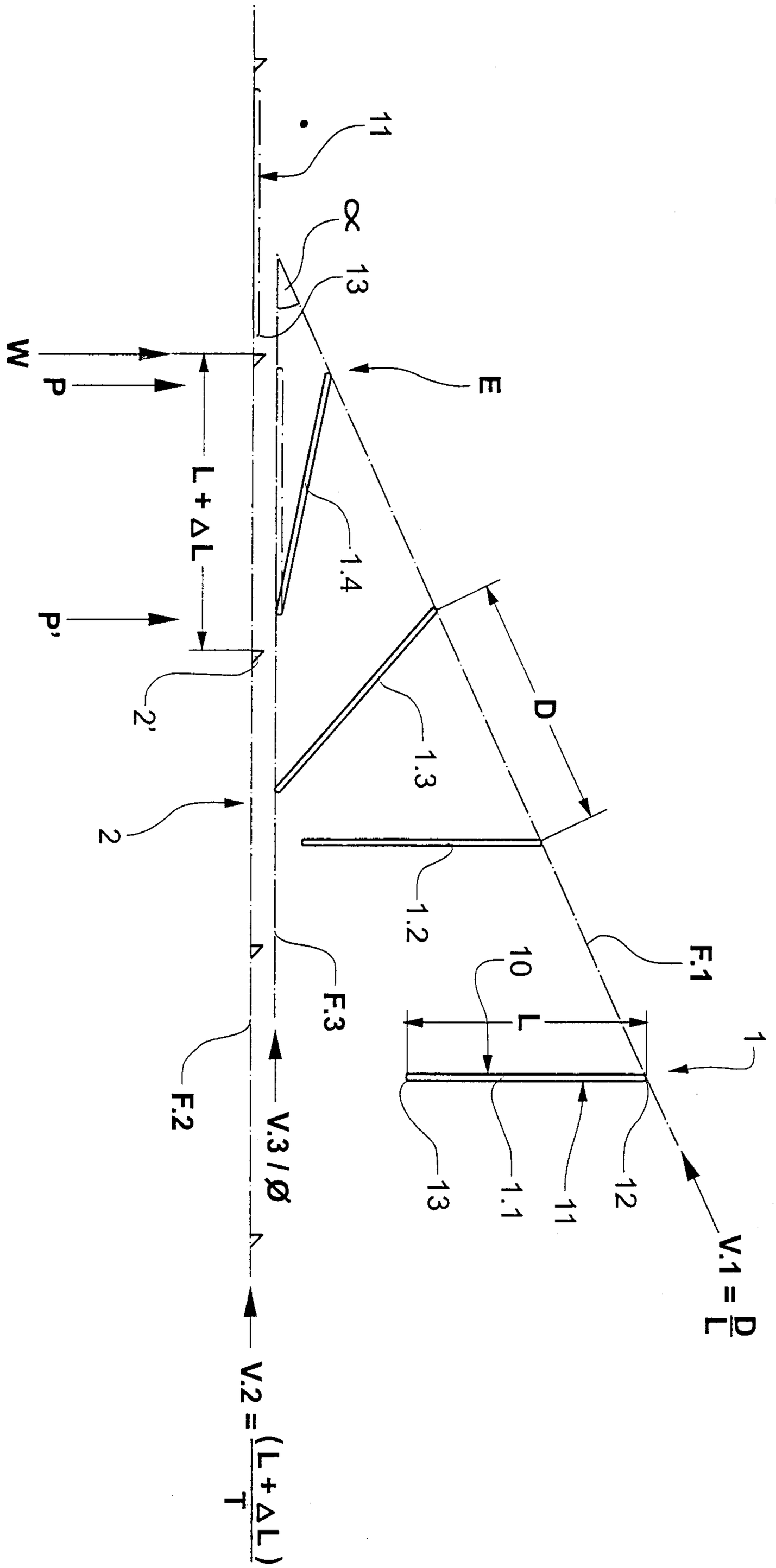
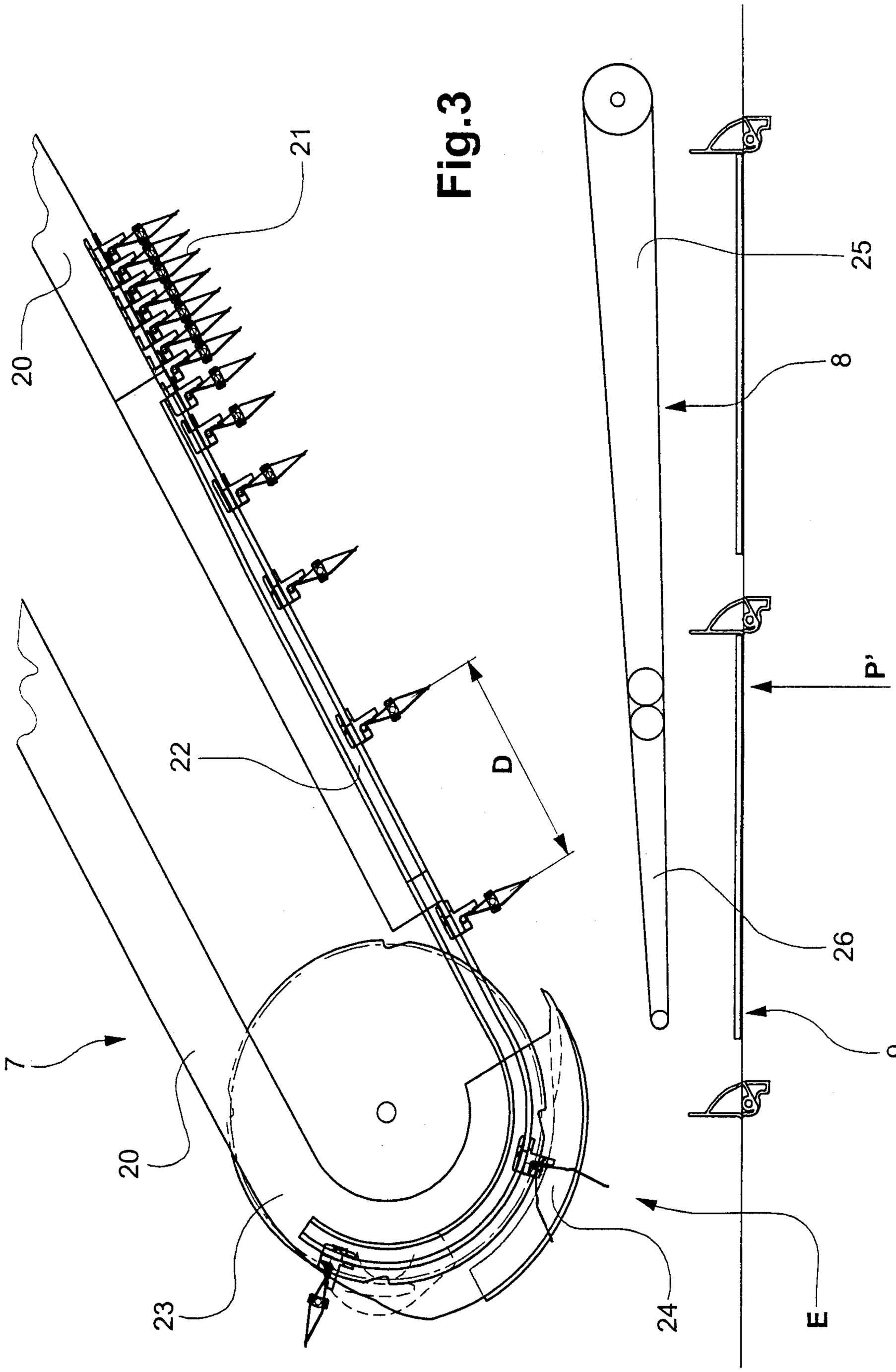

11
8
13
W
P
E
L + ΔL
1.4
P'
2'
D
1.3
2
1.2
F.1
10
L
1
V.1
13
1.1
11
12
F.3
F.2
V.3 / Ø
V.2 = (L + ΔL) / T
= D / L

Fig.2

Fig.3



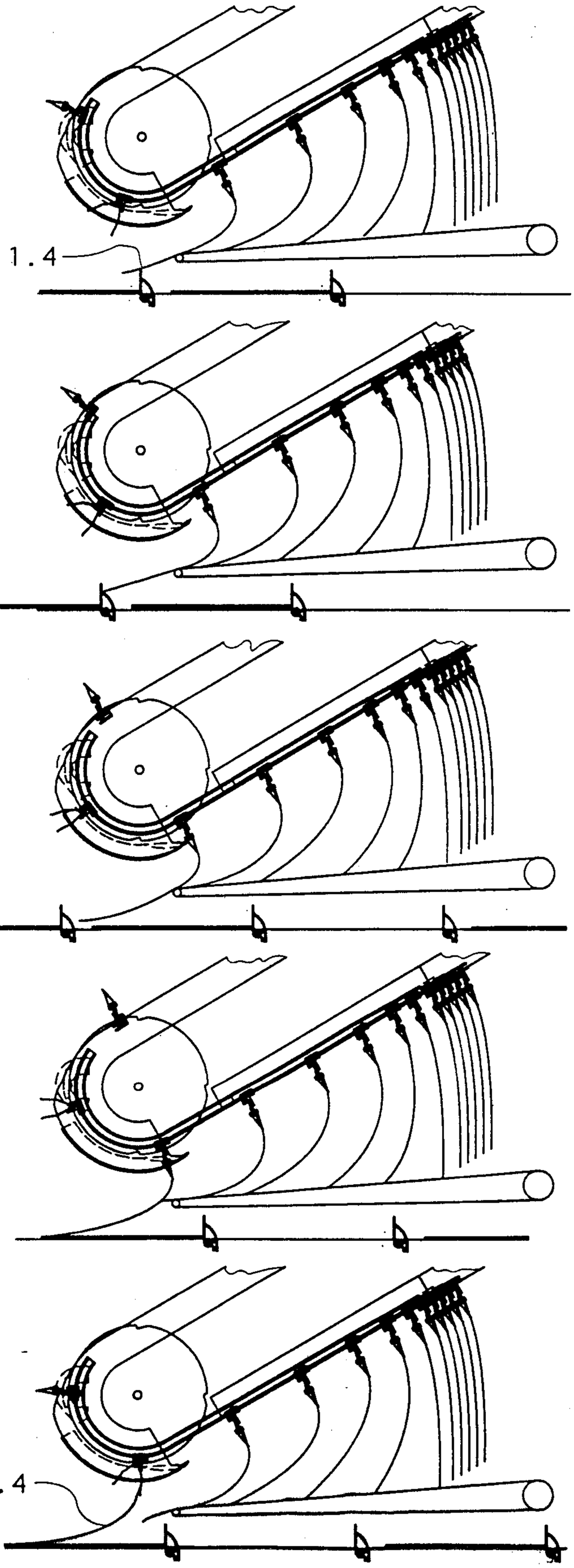


Fig.4

a

b

c

d

e

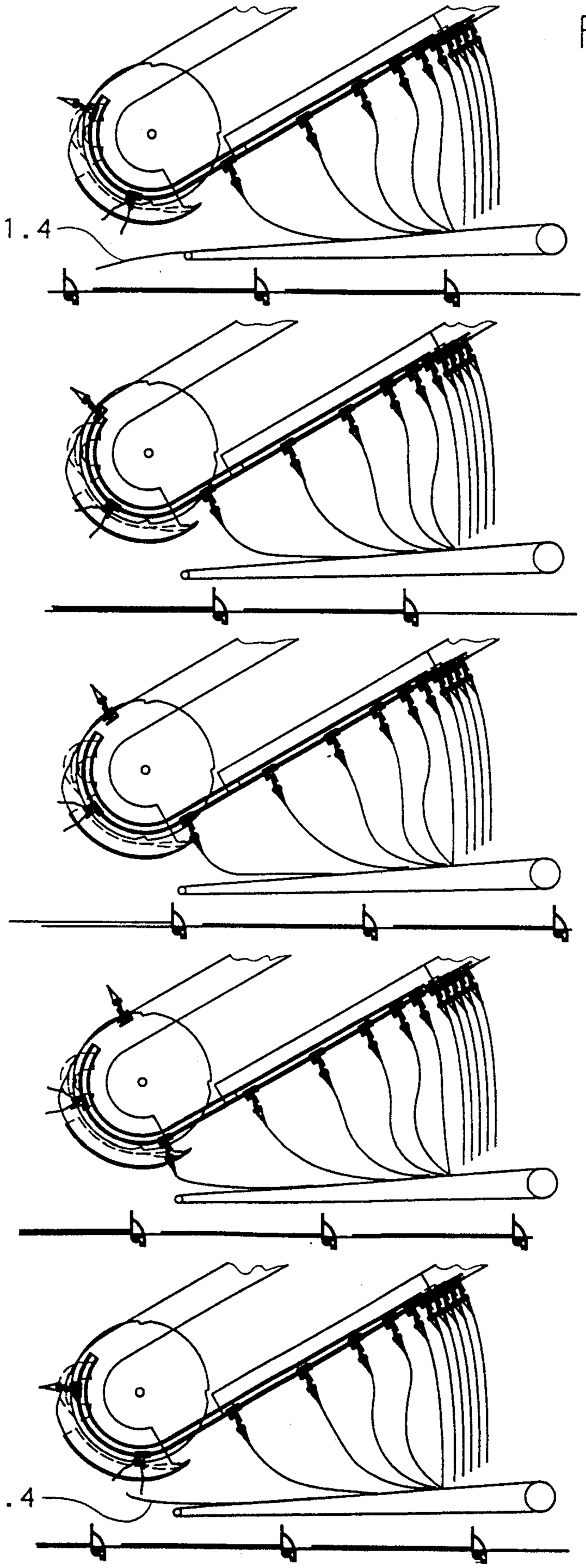


Fig.5

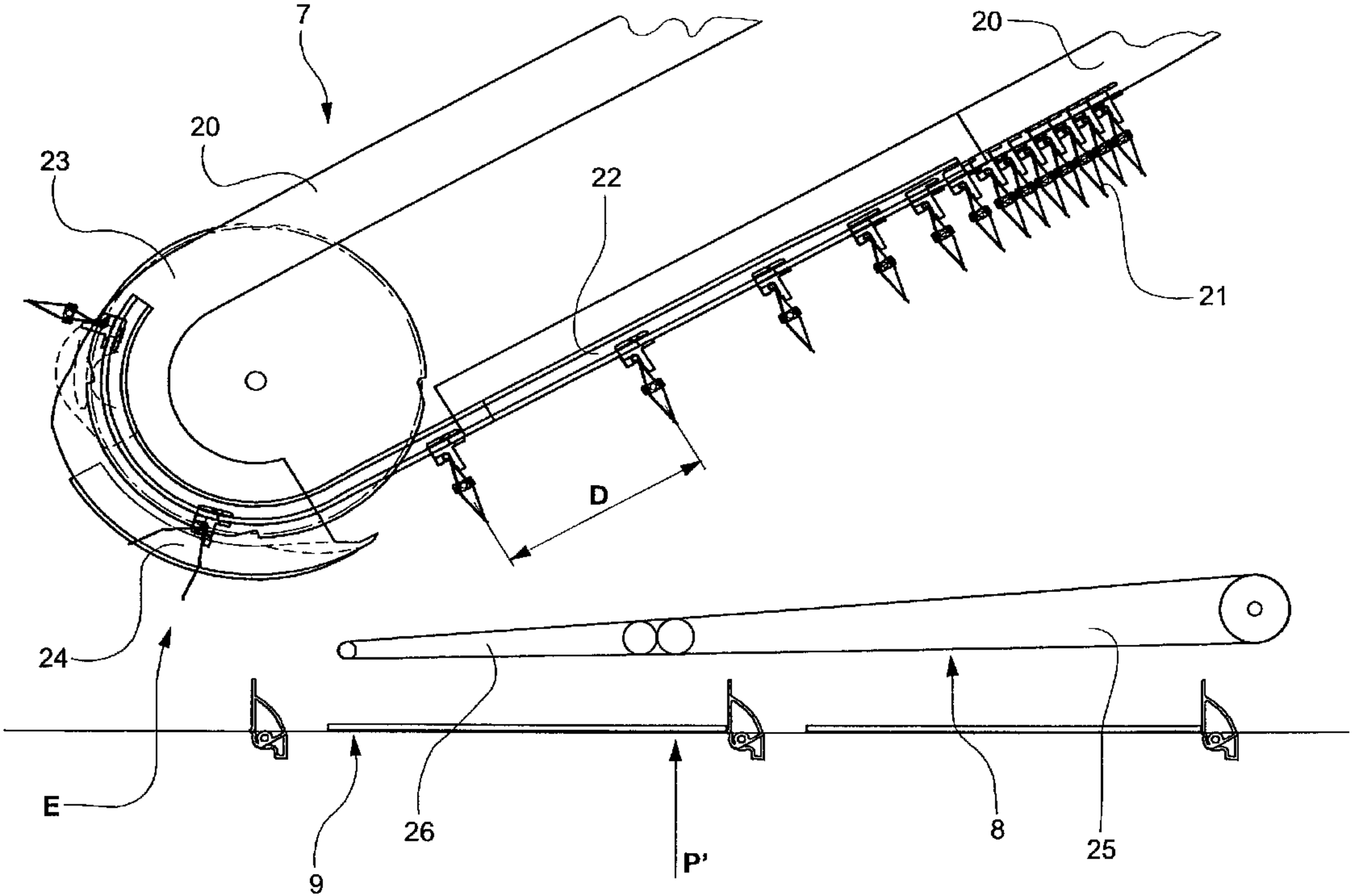
a

b

c

d

e


7
20
23
22
20
21
D
24
E
9
26
P'
8
25